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# USSR Report

CONSTRUCTION AND EQUIPMENT

(FOUO 5/82)



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USSR REPORT  
CONSTRUCTION AND EQUIPMENT  
(FOUO 5/82)

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(Mikhail Mironovich Shul'kevich, et al.; SPRAVOCHNIK  
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# CONSTRUCTION

## BOOK EXCERPTS: CONSTRUCTION QUALITY CONTROL

Kiev SPRAVOCHNIK PO KONTROLYU KACHESTVA STROITEL'STVA ZHILYKH I OBYASHCHESTVENNYKH ZDANIY in Russian 1981 (signed to press 21 Jan 81) pp 355-359

[Annotation and table of contents from book "Handbook on Quality Control of Construction of Residential and Civil Buildings" by Mikhail Mironovich Shul'kevich, Talida Danilovna Dmitrenko and Aleksandr Ivanovich Boyko, Izdatel'stvo "Budivel'-nik", 70,000 copies, 359 pages; passages enclosed in slantlines in boldface]

[Text] The handbook summarizes data on quality control in construction and installation operations and describes the requirements imposed for quality of construction materials and industrial structural components and the methods of controlling quality of products for their acceptance at construction sites.

In conformity with normative documents, the technical requirements are presented for production technology of zero-cycle operations [raboty nulevogo tsikla] and construction and installation and finishing work, as well as for operations involving the engineering equipment of buildings and public services and amenities for areas. Methods of evaluating the quality of basic types of construction and installation operations are described.

Normative materials are cited as of 1 July 1980.

The book is intended for engineering and technical personnel of construction organizations, customers' technical inspection engineers, personnel of planning organizations engaged in originator supervision [rabotniki avtorskogo nadzora], inspections of state architectural and construction verification, and public control of trade union organizations.

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BUILDING MATERIALS

BOOK ON OPTIMIZING PROPERTIES OF BUILDING MATERIALS

Moscow OPTIMIZATSIYA SVOYSTV STROITEL'NYKH MATERIALOV in Russian 1981 (signed to press 19 Mar 81) [no page and number given]

[Title page, annotation and table of contents from the book "Optimizing Properties of Building Materials," by V. G. Zazimko, Moscow, Izdatel'stvo "Transport", 4,000 copies, 103 pages]

[Text] Full title: "Optimizatsiya svoystv stroitel'nykh materialov: Uchebnoye posobiye dlya vuzov Zh.-d. trans." [Optimizing Properties of Building Materials: Textbook for Railroad Transport VUZ's] UDC: 625.06/.07.004.68

Reviewers: Doctor of Technical Sciences and Professor V. I. Solomатов  
Candidate of Technical Sciences G. I. Stupakov

Annotation: The basic technical properties of composition materials and the technological processes of their derivation as a function of a complex of factors, each of which is a random value, are described. The principles of probability theory and mathematical statistics are presented. The optimization of the basic technical properties of composition materials and the technological processes of their derivation, done using statistical methods, is examined. Examples are given of the resolution of tasks of optimizing the properties of composition materials being used in transport construction. The textbook is intended for use by construction-specialty students in transport VUZ's. Figures -- 29; tables -- 22; bibliographic entries -- six.

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METALWORKING EQUIPMENT

PROBLEMS IN MACHINETOOL INDUSTRY EXAMINED

Moscow VOPROSY EKONOMIKI in Russian No 4, Apr 82 (signed to press 26 Mar 82) pp 55-64

[Article by G. Kiperman and L. Vlasenkova: "Fulfillment Indicator of Contractual Obligations"]

[Text] In the fulfillment of the national-economic tasks for the current Five-Year Plan ensuing from the decisions of the 26th CPSU Congress, the chief emphasis is placed on expediting the growth rate of end-results through the intensification of the economy and increase in the effectiveness of social production.

At the November (1981) Plenum of the CPSU CC it was stressed that a smoothly coordinated performance of all elements of the national economy is becoming the principal prerequisite for streamlining the economy. That is why, in the system of measures outlined by the decree of the CPSU CC and the USSR Council of Ministers, "On Improvements in Planning and Intensification of the Effect of the Economic Machinery on Increasing the Effectiveness of Production and Quality of Work," a major role is assigned to refining the economic machinery for assuring proper mutual proportions of production, and to making the plans better balanced.

The balanced and smoothly meshed development of the economy hinges on the rigorous fulfillment by every association and enterprise of the plan of output and deliveries on schedule and in the necessary variety. This should be assisted by the procedure for assessing the performance of production enterprises, on chiefly proceeding from the fulfillment of the plan for deliveries of means of production and consumer goods in accordance with the contractual terms (or orders placed), as specified in the decree of the CPSU CC and the USSR Council of Ministers concerning improvements in the economic machinery.

The new accounting procedure with respect to the fulfillment of tasks and pledges for output deliveries as related to the awarding of bonuses to administrators, engineers, technicians, and white-collar workers is mandatory at production associations and in industrial enterprises as of 1 January 1978.

The application of this [fulfillment] indicator has favorably influenced the performance of associations and enterprises and enhanced their responsibility as suppliers to users. Further, it has contributed to focusing the attention of enterprises and their managers on assuring a smooth flow of production, as well as to an improved operational scheduling and a better observance of contractual obligations. All this

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binds together more closely the interests of suppliers and customers and, ultimately, the interests of individual production collectives with those of society as a whole, which is a major criterion of the progressiveness of economic methods of management. However, the introduction of the new indicators and its use as a criterion in awarding bonuses still has not resulted in a marked improvement in the on-schedule provision of a sufficiently varied supply of producer goods to customers.

The number of associations and enterprises that fail to fulfill their contractual obligations to customers has not decreased. In particular, the proportion of these enterprises during January to September 1981 amounted to 48 percent, which corresponds to the level for a like period in 1980. The overall shortfall in the supply of means of production and consumer goods has not diminished either: it amounted to 12.7 billion rubles. In 1980 the production associations (and enterprises) of the all-Union and Union-republic industrial ministries undersupplied their customers to the extent of about 17 billion rubles. Nearly 40 percent of that shortfall was in the sub-sectors producing raw and other materials and fuel; 14.2 percent, in the machine-building associations and enterprises; about 30 percent, in the sub-sectors producing consumer goods; and 1.8 percent, in the enterprises of the construction ministries.

The factors affecting the fulfillment of the production plan with allowance for deliveries are diverse and vary depending on the specific nature of the industrial sub-sectors. They can be conditionally divided into two groups: factors independent of the production and economic performance of the manufacturing enterprises, and factors dependent on that performance.

The first factors may include the failure of co-producing enterprises to fulfill their contractual obligations for the provision of raw and other materials, component products, etc. For example, the operating experience of the "Frezer" Moscow Machine Tools and Instruments Plant imeni M. I. Kalinin demonstrates that for many years it has not been supplied by metallurgical enterprises with the necessary quantities and variety of metal. In particular, in 1980 these co-producing plants undersupplied the "Frezer" Plant to the extent of 152 tons of high-speed steel, and 12 tons of hard alloys, which caused the plant to undersupply its customers to the extent of 1.7 million rubles of output. In the same year the "Krasnyy Proletariy" [Red Proletarian] Machine Tool Building Plant undersupplied its customers to the extent of 620,000 rubles of output, chiefly owing to the failure to receive on time its own supplies of metal and accessories.

A major effect on the fulfillment of the output and delivery plan is produced by shortcomings in the performance of transport, prolonged stoppages during loading and unloading operations, and idle runs, so that associations and enterprises are not adequately supplied with means of transport and the schedules for providing rolling stock to transport output are not being kept.

The fulfillment of shipments by enterprises is also complicated by delays in the reception of plans, orders, and other shipping documents, frequent modifications of orders placed by the material-technical supply agencies, and insufficient deliveries of raw and other materials and components from the bases and depots of the local agencies of the USSR Gosplan [State Supply Administration].

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In our opinion, the factors enumerated above are to a large extent due to the fundamental remissness of supply organizations and wholesale trading enterprises in introducing the new procedure for evaluating economic performance according to the fulfillment of obligations to customers. This markedly restricts the effectiveness of the fulfillment indicator as a means of improving the performance of industry.

Although the level of fulfillment of the orders placed is determined by evaluating the performance of the supply organizations, the principal indicator of that performance, in practice, remains the volume of goods turnover. It is this latter indicator that is used as the basis for calculating the needs for manpower and material resources at the supply organizations, as well as for determining labor productivity and the level of expenditures of liquid assets. Further, this indicator is used as the chief criterion for determining the bonuses paid to the employees of the supply organizations. That is why these organizations are interested in retaining this indicator. Inasmuch as it reflects the overall value of the sales of means of production and consumer goods, the indicator of goods turnover prompts the supply organizations to give warehousing and shipping priority to expensive products in large batches. Low-cost products and small shipments are inconvenient to supply organizations, since then the indicator of goods turnover is lower and hence also the bonuses are lower. Such products are reluctantly warehoused and sluggishly sold. And yet, even short-lasting interruptions in supply disorganize the operations of many enterprises and construction projects.

Considerable harm to the fulfillment of the plan for consumer goods supplies is caused by the discrepancies between the performance indicators used by industry and those used by trade. In trade, the principal indicator is goods turnover in retail prices. Yet the performance of light industry to this day is evaluated in terms of the fulfillment of the plan of sales in wholesale prices. At the same time, the fulfillment of the supply plan in financial terms (retail prices) and in kind is not considered when evaluating the performance of enterprises. As a result, industrial enterprises which officially fulfilled their sales plans remain debtors as regards supplying goods to trade and satisfying consumer demand. Thus, of the total number of light-industry enterprises which underfulfilled contractual obligations and orders for the supply of their products to the extent of 2,051 million rubles during the first 9 months of 1981, enterprises which officially fulfilled their sales plans account for 84 percent. During the first quarter of 1981 alone the light industry of the RSFSR underfulfilled its supply plan to the extent of more than 17 million sq m of cotton fabrics; mostly, these fabrics represent inexpensive but scarce goods: printed calico, satin, linen and kerchief fabrics, twin-color towels. Yet the sales plan was officially overfulfilled on the grounds that the resulting supply shortfall was offset by a factor of 1.5 by overfulfilling the plan with respect to the fabrics "advantageous" to the producers.

Shortcomings in material-technical supply and in the performance of transport as well as contract violations by co-producers and other factors outside the control of the particular enterprise itself affect just about equally the performance of different associations and enterprises. Yet these factors do not prevent many enterprises from completely fulfilling supply obligations to their customers. In the first 9 months of 1981, for example, 52 percent of production associations and



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enterprises whose performance reports were based on "output sales volume with allowance for fulfillment of delivery obligations," fulfilled completely their contract obligations to customers. During the same period, 20.4 percent of all Minstankoprom [Ministry of Machinetool Industry] enterprises fulfilled by 99.1-99.9 percent their sales plans with allowance for delivery obligations, and 31.8 percent had fulfilled it completely; at the Minpribor [Ministry of Instrumentmaking Industry] the corresponding figures were 20.3 and 42.5 percent; and at the Minavtoprom [Ministry of Automotive Industry], 17.7 and 18.3 percent.

Experience shows that at the enterprises and associations with an efficient organization of all management links, proper operational planning, smooth production operations, proper monitoring of the fulfillment of delivery obligations, long-time economic contacts, and a rational application of economic incentives, the plan for output deliveries is as a rule completely fulfilled, year after year. This applies in particular to such machinetool enterprises as the Novosibirsk Plant imeni 16th Party Congress, the Khabarovsk and Gomel' imeni S. M. Kirov plants, and the Yerevan' Production Association of the "Soyuzstankoprom" VPO All-Union Machinetool Industry.

The operating experience of the industrial enterprises indicates that the principal causes of the underfulfillment of contractual product delivery obligations and orders is shortcomings in the organization of production at associations and enterprises: snags in production, delays in organizing the manufacturing of new product types, inefficient utilization of equipment and material resources, faulty introduction of new equipment, technologies, and mechanization of labor-consuming processes, and the absence of an efficient shipment control system.

The effectiveness of the new indicator is largely due to the role which it plays as an incentive for improving the production and economic performance of enterprises (associations) in the sense of evaluating the performance of the plant personnel.

Operating experience indicates that the introduction of the new indicator does not restrict the scope of the indicator of overall sales volume, which remains the principal indicator for evaluating the performance of production associations (enterprises) and continues to conflict, in a way, with the indicator of the fulfillment of delivery obligations. The reason is that the fulfillment of delivery obligations is verified according to the shipping or delivery of products by transport organizations, whereas the fulfillment of the sales plan is verified according to the payments made--which requires the observance of contracts not only by consigners but also by consignees. The latter, for some or other reason, not infrequently violate their payment obligations, thus threatening the fulfillment of the plan of overall volume of sales and income by the suppliers. For example, delays by customers in paying for shipments of products by the Lubno "Kommunar" [Communist] Machinetool Plant during the first half of 1981 reached: for ZU133 machine tools, 54 and 37 days; for ZM131 machine tools, 41, 54, and 21 days; for ZA423 machine tools, 53, 23, and 26 days; for ZM175 machine tools, 71 days; and for ZU131M machine tools, 8 days.

Under such conditions, considering that the indicator of the overall sales volume directly affects their profits and incentives, suppliers are primarily concerned for the fulfillment of that indicator. This can be seen from a comparison of the

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fulfillment of plans for overall sales volume with allowance for delivery obligations. According to USSR TsSU [Central Statistical Office] data, during the first 9 months of 1981, more than 70 percent of the production associations and enterprises which underfulfilled their contractual and order delivery schedules had fulfilled or overfulfilled their plans for overall sales volume. For example, enterprises of the Minkhimmash [Ministry of Chemical Machine Building Industry], which underfulfilled by 97 million rubles their delivery tasks and obligations during the first half of 1981, overfulfilled their plans for output sales volume by 39.8 million rubles; for Minzhivmash [Ministry of Food Machine Building Industry] the corresponding figures were 17.9 and 28.2 million rubles, respectively; and for USSR Minlegprom [Ministry of Light Industry] enterprises. 1,342.6 and 499.5 million rubles, respectively. Between January and September 1981 industry as a whole overfulfilled its sales plan by 0.6 points and underfulfilled its sales plan with allowance for deliveries by 3.2 points.

To fulfill their "obligatory" indicators (sales volume and profits), the supplier enterprises sometimes deliberately violate their contracts by shipping their products ahead of schedule to those customers who can guarantee payments. Certain enterprises during the second half of the month ship their products preferably to nearby customers. Hunting for possibilities of selling more products, the suppliers not infrequently underfulfill plans of new equipment or co-produced shipments in order to compensate for the shortfall in financial receipts.

Thus, in the system of plan and evaluation indicators, the new indicator still does not play the role assigned to it by the decree on improvements in economic machinery. Its role so far has been secondary, and hence it has not reliably protected the interests of customers. At the November (1981) Plenum of the CPSU CC L. I. Brezhnev pointed out that the decree of 12 July 1979 of the CPSU CC and the USSR Council of Ministers "is being introduced slowly and as a half-measure" with respect to evaluating the economic performance of production enterprises (associations) and providing them with the proper incentives as measured by the criterion of the fulfillment of product delivery tasks and obligations.

One reason for the relative ineffectiveness of the new assessment indicator has been the fact that the instructions specifying the accounting procedure as regards the fulfillment of product delivery tasks and obligations do not quite meet the needs as regards awarding bonuses to managers, engineers, technicians, and white-collar workers. These instructions make the delivery fulfillment indicator applicable only to the material incentives for managers, engineers, technicians, and white-collar workers of the industrial enterprises and supply organizations, as they delegate to the ministries and departments the right (together with the USSR Gosstat) to determine the percentage of underfulfillment of delivery plans at which the employees of the production associations (enterprises) of industry as well as of supply organizations can be completely deprived of bonuses for basic economic performance, and to determine the extent of reduction in bonuses in cases in which the underfulfillment of the sales plan with allowance for deliveries is below a certain percentage.

As a result the range of minimum percentage varies broadly among individual sectors and within the sectors and sub-sectors. In particular, in 1981 the Minstankoprom [Ministry of Machine Tool Industry] specified a minimum of 2 percent

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underfulfillment for 19.3 percent of its enterprises; from 2 to 4 percent for 51.1 percent of its enterprises; from 4.5 to 8 percent for 24.2 percent of its enterprises; and more than 8 percent for 5.4 percent of its enterprises. Yet, as noted previously, a close interrelationship of different industrial sub-sectors requires a smooth meshing of their operations, which is not possible unless mutual deliveries among co-producing sub-sectors are strictly implemented.

Analysis shows that ministries often impose excessively high minimum percentages of underfulfillment of output sales volume with allowance for delivery obligations. Thus, at the enterprises of the VPO "Soyuzstankoprom" the minimum percentages approved for 1980 ranged from 3.0 to 9.0 percent while the actual shortfall in deliveries reached 7.1 percent

Most dubious in this context is the expediency of fixing different minimum percentages of underfulfillment for enterprises operating under the same objective conditions. True, this is done with allowance for the actual percentage of underfulfillment during a reference period, but that is nothing else than a variant of the long-condemned method of planning "according to the level attained." The fact that actual underfulfillment of deliveries often turns out to be below the specified minimum percentage markedly reduces the effect of the indicator of delivery fulfillment on the amounts of bonuses granted for basic production performance.

It is worth noting that in practice the permissible underdelivery percentage has, as it were, become a standard whose observance could be used almost with impunity to let down customers and even then to be a victor in socialist labor competition. The reason is that the instructions in force downgrade the role of the indicator of delivery fulfillment as a standard for sales volume and do not promote material and moral incentives for the fulfillment of that indicator. Some sub-sectors of industry do include this indicator among the terms of socialist labor competition. But in such cases the level of fulfillment of this indicator in relation to sales volume has been set at below 100 percent for both contestants and victors. For example, at enterprises of the electrical engineering industry this level has been set at 93-97 percent (depending on the nature of their production). In particular, victory in the sub-sector competition for the first quarter of 1981 was awarded to the Cheboksary Electrical Equipment Plant which fulfilled only 96.3 percent of its scheduled contractual delivery obligations.

The reductions in bonuses for basic results of economic performance have been performed according to criteria developed by the ministries. Considering that the existing [decreed] instructions do not provide for any standardization of such criteria, do not restrict the minimum allowable percentages of delivery underfulfillment, and do not link them to the actual percentages of such underfulfillment and to the extent of reduction of bonuses, every ministry and production association has approached this problem differently. A broad variety of different criteria for reducing bonuses to managers in the event of underfulfillment of deliveries has appeared. Fairly often in different sectors and sub-sectors of industry, for the same minimum percentages and the same actual underfulfillment of sales volume with allowance for deliveries, the applicable reductions in bonuses vary. Most of the existing criteria for reducing such bonuses do not meet the principal

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requirement of increasing the level of material responsibility for the underfulfillment of delivery tasks and obligations in measure with approach to the minimum percentage level. Thus, one of the criteria of this kind applied by the Minstankprom provides for depriving managers of 50 percent of their bonus if the sales plan with allowance for deliveries is underfulfilled by 6.7 percent--and for depriving them entirely of their bonus if the plan underfulfillment is just 0.1 percent greater (6.8 percent).

The procedure existing since 1978 provided for a cumulative determination of the extent of underdelivery to mobilize the interest of the enterprises in compensating, during the subsequent periods, the shortfalls in quantity and variety of the off-schedule deliveries during the preceding period. But such a procedure ignores the time factor, since an enterprise which underfulfills its deliveries during the first quarter of the year but compensates for them with increased deliveries during the second or fourth quarter, is entitled to receive an intact amount of incentive funds. It thus turns out that the losses sustained by society owing to underfulfillment of deliveries during the first quarter do not affect adversely the incentive funds received by the supplier enterprise.

To strengthen the effect of the indicator of fulfillment of delivery tasks and obligations (in relation to sales volume) on the performance of associations and enterprises, a new set of instructions has been drafted and approved with respect to the accounting procedure for the fulfillment of the tasks and obligations of delivering industrial and consumer goods on schedule, in accordance with contracts, to be applied to the evaluation of performance and granting of incentives to production, supply-marketing, and trade associations, enterprises, and organizations. These new instructions are effective as of 1 January 1982.\*

Pursuant to the decree of the CPSU CC and the USSR Council of Ministers on improvements in the economic machinery, the new instructions proceed from the premise that the fulfillment of the tasks and obligations as regards the delivery of industrial and consumer goods is to be a criterion in evaluating the performance of enterprises, associations, and organizations; determining the scope of incentive funds; awarding bonuses to managers, engineers, technicians, and white-collar workers; and assessing the results of the all-Union and republic socialist labor competitions. Thus, this decree enhances the role of the indicator of sales volume with allowance for deliveries in the system of indicators, and links it to other economic instruments.

While they retain the existing procedure for crediting full or partial compensation for underdelivered output during a subsequent period, and for fulfilling the indicator of sales volume with allowance for deliveries, the new instructions provide for a compromise decision--a partial restoration of the withheld amount of incentive funds. The procedure for and extent of utilization of the reimbursed material incentive funds are to be determined by the USSR Gosplan, the USSR Ministry of Finance, the USSR Goskomtrud [State Labor Commission], and the VTsSPS [All-Union Central Council of Trade Unions].

The instructions provide that underfulfillment (cumulatively, since the beginning of the year) of output delivery tasks and obligations by associations, enterprises,

\*See EKONOMICHESKAYA GAZETA, No 44, 1981, p 15.

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and organizations excludes them from eligibility for relay Red banners and first, second, and third prizes in all-Union and republic socialist labor competitions.

These new instructions also specify that the minimum percentage of underfulfillment of output delivery tasks and obligations, as established by ministries and departments for the associations, enterprises, and organizations under their jurisdiction, may not exceed 2 percent, and in isolated instances, 3 percent.

In the event of underfulfillment of tasks and obligations with respect to deliveries of certain means of production that are of major importance to the national economy, no bonuses at all will be awarded to managers of associations, enterprises, and organizations for their economic performance, regardless of any specified minimum percentage.

The new instructions further specify the standard criterions for reducing the bonuses awarded to managers of associations, enterprises, and organizations, by linking the percentage of delivery underfulfillment and the extent of bonus reduction to a minimum percentage of underfulfillment below which these managers are entirely deprived of their bonuses, thus making these criteria uniform for all sub-sectors of industry. The criteria are so designed that the degree of "punishment" is reduced when the underfulfillment is slight but markedly increased when the underfulfillment is considerable.

Further, the new instructions define more precisely and specify the principles governing the roster of branches and types of production to which they apply and the determination of the volume of output sales with allowance for the fulfillment of delivery obligations as well as the pertinent statistical reporting procedure. Even so, many questions still remain unresolved.

There is much room for improvement in the method itself of calculating the percentage of the fulfillment of output sales plans with allowance for the fulfillment of delivery tasks and obligations. Since the total delivery shortfall, as computed cumulatively since the beginning of the year, is linked to the volume of sales planned since the beginning of the year, in practice different measures of material responsibility are meted out for the same amounts of delivery shortfall. Suppose that a yearly sales plan amounting to 4 million rubles is uniformly divided among the quarterly periods. Given a 10,000-ruble delivery shortfall during the first quarter, under the current procedure the percentage of shortfall in the first quarter will be 1.0 percent; in the third quarter, 0.33 percent; and in the fourth quarter, 0.25 percent. Material responsibility for the shortfall correspondingly diminishes. Thus, given a minimum acceptable underfulfillment percentage of 1 percent, the extent of reduction in bonus will be (pursuant to the appropriate standard criteria in the new instructions) 75 percent in the first quarter; 50 percent in the third; and 25 percent in the fourth.

Given such a computational procedure, it is convenient for enterprises to establish underestimated output and delivery plans for the first one or two quarters of the year and unjustifiably to postpone until year-end the most labor-intensive, responsible, and inconvenient orders (which, as a rule, include most of the tasks relating to the production of new equipment). All this can adversely affect the

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smoothness of production throughout the year and the fulfillment of the output (delivery) plan as a whole.

In our opinion, calculations of the percentage of output underdelivery should be linked to the plan (report) period in which underdelivery took place and for which bonuses, or rather reduced bonuses will be paid. In any such [quarterly] period the reduction in bonuses for the same output underdelivery should be of the same extent. To this end, the calculations of percentile fulfillment of the output sales plan with allowance for actual deliveries should allow for cumulative fulfillment of deliveries and be linked to the planned sales volume for the reporting period concerned. Such a calculational method would contribute to tightening the delivery discipline and the responsibility for the period of increased deliveries to compensate customers for the shortfalls.

It should also be stated that the new assessment indicator has "inherited" from the indicator of general sales volume the shortcomings inherent in its value structure, which is analogous to the structure of gross and marketable output. The interestedness of enterprises in producing expensive, less labor-intensive, and relatively more material-intensive products has not been counteracted. This is reflected in the attempts of enterprises to influence correspondingly the formation of the delivery plan. The "gross[-volume] approach" to determining the shortfall in deliveries (the adding-up of quantitatively large low-cost under-deliveries) results in that even a major violation of contractual obligations to deliver relatively low-cost but important products (spare parts, etc.) is hardly noticeable against the background of the overall volume of sales. Such an approach markedly weakens the mechanism of the fulfillment of all contractual obligations without exception.

One way of improving the methods and indicators of planning and incentive granting at present is the refusal to use the indicator of gross (or marketable) output in evaluating the performance of enterprises. The principal indicator of output volume at enterprises (chiefly within the branches of the processing industry) is, increasingly, the indicator of net (normative) output. This role is still played by the indicator of marketable output only in certain sub-sectors--the raw materials industries and the industries in which changes in variety of output and in raw material needs do not significantly affect economic performance. In this connection there arises the question of whether the fulfillment of delivery plan can be evaluated in relation to volume of output calculated in terms of normative net output (NNO)?

In our opinion, this evaluation is not only feasible but advisable, since it will aid in eliminating the existing contradiction between the evaluations of plan fulfillment in kind and in terms of financial value. This also would promote orienting the associations and enterprises toward fulfilling their output and delivery plans in terms of the planned variety (products list). A basis for evaluating the fulfillment of the delivery plan in terms of NNO has been provided by the conversion of most industrial sub-sectors, as of 1982, to new wholesale prices with respect to which the price lists specify the norms of net output. At the same time, a more substantiated solution of this problem requires an experimental verification of the evaluation of delivery plan fulfillment on the basis of NNO and its

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relation to the system of plan and assessment indicators of the performance of associations (enterprises).

A major problem remains the meshing together of the various economic instruments in order to assure the complete fulfillment of the output delivery tasks and obligations in the quantity and variety meeting the contractual obligations and requisitions as well as the orders placed by foreign-trade organizations, within the scheduled target dates.

The new instructions provide for reducing the deductions for the incentive fund in the event of failure to fulfill contractual deliveries on schedule. However, this does not completely solve the problem. Analysis of the crediting of incentive funds at industrial enterprises reveals that the effect of the indicator "sales volume with allowance for the fulfillment of delivery obligations" on the size of these funds is minor, and that the reduction in these funds owing to under-delivery of output is insignificant owing to the low deductions specified per percentage point of underfulfillment of the plan for sales volume with allowance for the fulfillment of output delivery tasks and pledges. For example, the following norms for reducing incentive funds have been fixed for the associations and enterprises of VPO "Soyuzstankoprom" per percentage point of decrease in: labor productivity, 2.6 percent; share of output belonging in higher quality category, 2.6 percent; per percent of increase in production cost, 0.65 percent; per percent of underfulfillment of output delivery tasks and obligations, 1 percent; and per percent of decrease in sales (profits), 1.3 percent. The lack of uniformity in these norms is still greater in the electrotechnical industry. Thus, at the Kamkabel' Cable Plant in Perm', the plants manufacturing electrotechnical equipment, high-voltage electrical insulators, and electromechanical equipment, and the Lys'venskiy Turbogenerator Plant, for every percentage point of decrease in output in the higher quality category the amount credited to the incentive fund from profits is reduced by 6 percent, whereas for every additional percentage point of delivery underfulfillment the reduction in that amount is 0.5-1.5 percent.

Moreover, these reductions in incentive funds are partially or entirely offset by their increases to reward plan overfulfillment in terms of labor productivity, share of output in the higher quality category, or additional profits from sales of output in the higher quality category (part of surcharge on wholesale price). It thus appears expedient to increase the incentive-fund penalties for failure to fulfill delivery obligations, to the same extent as the penalties applied for a decrease in the share of higher-quality output or in labor productivity.

The new instructions specify that in the event of fulfillment of all output delivery tasks and obligations by associations, enterprises, and organizations, their managerial personnel, engineers, technicians, and white-collar workers will receive increased bonuses. A similar provision had also existed in the previous instructions, with regard to both the fulfillment and the overfulfillment of the delivery plan. For example, within the Minstankoprom the regular bonus can be increased up to 25 percent depending on the importance of the additionally delivered products. In practice, however, this provision has not been applied, since the enterprises lacked the funds to pay that extra bonus. To stimulate the

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fulfillment of the plan of sales volume with allowance for deliveries, a provision should be made for augmenting the incentive fund. Thus, since 1981, the Minelektrotekhprom [Ministry of Electrotechnical Industry] has been allowed to augment its incentive funds by 10 percent, and to increase the bonuses awarded, for complete fulfillment of the output delivery plan.

Experience shows that enterprise heads receive bonuses not only for fulfilling the orders placed but also for a great many other indicators. If they underfulfill the delivery plan, they recoup the bonuses lost for this reason by receiving bonuses for other reasons such as, say, for supplying scrap, promoting innovations, conserving resources, introducing new technologies, etc. There is a need for establishing that bonuses for these other indicators may not be awarded in the event of underfulfillment--below some specified minimum percentage--of delivery obligations.

To enhance the effectiveness of the indicator of sales volume with allowance for fulfillment of obligations as a criterion for evaluating the performance of enterprises, it is necessary to radically improve the study of supply and demand; to prepare and approve in good time the yearly plans, as specified in the decree on improvements in the economic machinery; to sharply enhance the role of long-term direct ties among enterprises; and to make the rigorous observance of contractual obligations the main criterion for evaluating the performance of enterprises. The established minimum underdelivery percentages should be of an interim nature, and within the next few years they should be revoked. But even this will not produce the expected results unless every enterprise and association introduces a system of measures to assure smoothness of production and an unconditional fulfillment of the plans for the variety (assortment) of output. This presupposes major improvements in operative production planning, intra-plant cost effectiveness analysis, and monitoring of the fulfillment of every order.

There is no doubt at all about the importance of indicators in ensuring a balanced production and promoting an increase in and improvements of production. But this role should not be exaggerated. In themselves, indicators do not, of course, affect the level of performance of enterprises and associations; they merely orient management and labor toward taking the measures needed. This equally applies to the indicator of sales plan fulfillment with allowance for the implementation of delivery obligations. The indicator shows which measures must be taken, or rather what complex whole of measures must be taken, in order to assure the implementation of the terms of every contract and every customer order. This work should be organized by the ministries with broad participation by sector scientific research institutes.

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METALWORKING EQUIPMENT

METAL USE IN MACHINETOOL INDUSTRY DISCUSSED

Moscow VOPROSY EKONOMIKI in Russian No 4, Apr 82 (signed to press 26 Mar 82) pp 75-82

[Article by N. Ivantsova: "Metals Demand of Production and the Potential for Conserving Metals"]

[Text] The CPSU CC and USSR Council of Ministers decree "On Intensifying the Work on the Conservation and Rational Utilization of Raw-Material, Fuel, Energy, and Other Material Resources," outlines a complex whole of specific measures to improve the system for the planning and promotion of the utilization of material resources. This concerns the conservation of resources both during production and during the utilization of the finished products.

The major customers for finished metal products are machine building, metal machining, and construction. The growth rates of these sub-sectors and the changes in their structure as well as in the metal requirement of their production directly affect the volume of metal consumption and the metal requirement of the finished products. Machine building and metal working are the largest consumers of metal. Thus, metals account for about 30 percent of the material expenditures of machine building and metal machining, with allowance for intra-plant turnover in the machine building industry--or for 50 percent if that turnover is disregarded, i.e. they account for the principal part of the sub-sector's material expenditures.

The level of metal requirement of production is still comparatively high, which leads to considerable waste of metal in the metal-consuming branches. At the 26th CPSU Congress L. I. Brezhnev pointed out that cutting in half the losses and wastes of metal in metal working would be tantamount to a 10-percent increase in the output of ferrous rolled stock. The waste of metal in the metal-using branches is increasing and at present it exceeds 19 million tons annually (of which 9 million tons wasted in chips). The utilization factor of rolled stock in machine building has remained at the unchanged level of 0.72 for the last 10 years. The decree on the conservation of material resources points to the need to improve the structure of the national economy and its branches in the direction of an all-out reduction in the energy- and material-intensiveness of production.

The unit metal requirement of production within discrete machine-building and metal-machining subsectors varies, and hence changes in the sub-sector structure of that complex affect differently the metal requirement of the production of machine building, industry, and national product as a whole. Within machine building itself the most metal-intensive subsectors are: heavy, power, transport, tractor,

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and agricultural machine building. Their share of the sector's gross output is substantial (nearly 30 percent) and affects the increase in the metal-intensiveness of the production of the entire machine building sector. In the long run, the growth rate of the output volume of these sub-sectors will somewhat slow down and their share in the output of machine building will decrease, which will result in a decreased metal-intensiveness of the production of machine building as a whole. The level of metal-intensiveness of the production of road-construction and chemical machine building sub-sectors as well as of the automotive industry is close to the level of metal-intensiveness of the production of machine building as a whole. The share of this group of sub-sectors will keep rising, and it will lead to some increase in the level of metal-intensiveness of the machine building sector as a whole.

Not as metal-intensive are machinetool and machine building for the light and food industries, the electrotechnical industry, and, especially, instrumentmaking. The metal-intensiveness of instrumentmaking is only one-seventeenth as high as that of the production of heavy, transport, and energy machine building sub-sectors. The vigorous development of the above sub-sectors with their lower metal-intensiveness will contribute to reducing the metal-intensiveness of the machine building sector as a whole, even though the demand for metal will increase in volume.

Studies of the internal structure of individual sub-sectors of machine building point to a considerable potential for reducing metal-intensiveness through improvements in the structure of these sub-sectors and in the design of the products they manufacture. The production structure of tractors, machine tools, and certain other types of machinery and equipment still remains fairly metal-intensive. Thus, caterpillar tractors account for a substantial part (40 percent) of the structure of tractor building. The metal consumption norm per caterpillar tractor is greater by a factor of 1.8 than per wheeled tractor. In the long run, the tractor production structure should be improved by increasing the share of wheeled and low-power tractor types, including garden and orchard tractors. This will help reduce the metal-intensiveness of tractor building as well as of machine building as a whole.

The most effective ways of reducing the unit metal-intensiveness of production per unit of basic machine parameters are: concentration of capacities within a discrete assembly, increase in productivity, and improvements in the performance characteristics of machinery and equipment. In recent years a gap has arisen between technical potential of many types of equipment manufactured and the actual level of its utilization; that is, the increased parameters are far from being fully utilized. For example large- and heavy-sized metalworking equipment accounts for a large part of the output structure of metal-cutting machine tools and press-forging equipment. Such a ratio results in greater metal-intensiveness of the production of machinetool building as well as of machine building as a whole, but even so the larger machine tools are far from always operated at full capacity. This results in wasteful expenditures of not only material but also manpower resources. That is why it is so important for designers and developers to proceed from actual operating conditions of equipment when devising new types of machinery and equipment.

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Improvements in the type-size structure of machinery and equipment remain a topical problem. Potentially, they lead to considerable savings of metal and other production resources. Given the same resources of metal and the same production capacities, relatively low additional outlays could result in a marked increase in machine-building output. To uncover such potential, the design and operation of machinery should be based on a unit metal-intensiveness adapted not only to the specifications of machines but also to the operations they are designed for. This indicator is derived from the ratio of all material (production and operating) expenditures to the volume of operations performed by a machine during its service life until the first major overhaul. The work to optimize machinery type-sizes should be carried out in every sub-sector of machine building. The Main Directions of the Economic and Social Development of the USSR for the 1981-1985 Period and for the Period Until 1990 point out that unit capacities of machinery and equipment should be increased within optimal limits while at the same time reducing their dimensions, metal-intensiveness, energy-intensiveness, and the cost per unit of final useful effect.

An efficient utilization of metal products in the metal-using branches as well as the development of ways of saving metals during their treatment largely depend on the metallurgical sub-sectors. Despite the definite accomplishments in improving the structure and quality of metals, the demand of branches of the national economy for most highly economical types of rolled stock is being far from adequately met. Many domestically produced machines are heavier than their foreign-produced counterparts, chiefly owing to an insufficiently progressive structure of metals: the comparatively high proportion of castings in the structure of metal production and the insufficient proportion of rolled plate and especially sheeting in the structure of rolled stock.

The factors decisive to the level of the metal-intensiveness, reliability, and length of service life of machinery, instruments, and structural elements include in particular the quality and structure of ferrous metals. Metal-intensiveness of structural elements can be reduced by improving the structure of the production of metallurgy through a reduction in the share of castings and an increase in the share of rolled stock, especially sheeting and its economical types. In recent years the structure of ferrous metals used has become more progressive, but the share of castings still continues to be comparatively high (see table).

As can be seen from the figures in the table, the structure of metallurgical products used in machine building as a whole for the last 15 years has not changed significantly: the share of castings decreased 3.3 points and that of sheetings increased 5.7 points. In the largest metal-using sub-sectors--machinetool building, the automotive industry, and heavy and chemical machine building--the share of castings has remained at practically the same level. Even for 1985, the anticipated decrease in the share of castings for all sub-sectors of machine building--exclusive of machinetool building and road-construction machine building--will be insignificant.

The relatively high proportion of castings in the structure of metal consumption is in some cases attributable to shortages of certain types of ferrous rolled stock. This results in producing castings from heavy-weight ingots as well as in a metal-intensive structure of some sub-sectors of machine building. Analysis of

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the structure of the consumption of castings has shown that in the long run the volume of the production and consumption of castings can be reduced by 5-7 million tons annually by supplanting cast components with rolled products and reducing the weight of castings through the introduction of precision casting techniques. This will make it possible to reduce the metal-intensiveness of production and obtain substantial savings. Thus, the replacement of cast components with welded sheet components saves roughly 103 rubles per ton. Consequently, the replacement of 5-7 million tons of castings with rolled components would save 500-700 million rubles annually for the national economy as a whole.

Table: Rounded-Off Structure of Metal Consumed by Machine Building (in %)

Metal-Consuming Sub-Sector	Share of Castings in Metal Production		Share of Rolled Sheets in Finished Rolled Stock	
	1966	1980	1966	1980
Machine building and metalworking	31.1	27.8	46.9	52.6
Of which:				
Tractor and agricultural machine building	38.8	31.9	35.5	43.2
Heavy machine building	32.9	33.3	46.3	49.7
Automotive industry	18.6	18.5	40.3	49.0
Machinetool building industry	51.5	51.1	30.3	38.0
Road-construction machine building	29.9	24.0	54.7	59.2
Chemical machine building	35.4	34.7	48.0	61.3

Currently certain organizations in this country have been working on the technical and economic substantiation of the manufacture of rolled-stock weldments in lieu of castings. The institutes of the machinetool and instrumentmaking industry have developed a large number of welded rolled-stock bed plates replacing cast-iron bed plates for lathes, grinding machines, roughing machines, and press-forging machinery. Lightweight designs of agricultural machines using rolled-stock components in lieu of cast components have been developed.

Extensive work to reduce the metal-intensiveness of structural elements is being done by the VNIImetmash [All-Union Scientific Research and Design Institute of Metallurgical Machine Building] which, together with the Institute of Electric Welding imeni Ye. O. Paton, has developed an automatic line for the production of sheet-steel radiators (in coils, by the die-forging and welding method) in lieu of cast-iron radiators. The mass (unit metal-intensiveness) per equivalent square meter of a welded sheet radiator is lower by a factor of 3.4 than that of a cast-iron radiator. The production of radiators from rolled sheets will save considerable quantities of metal. The VNIImetmash has also developed a new method for designing prestressed bed plates of hydraulic presses and rolling and tube mills. The development of presses with prestressed bed plates reduces metal consumption by a factor of 2-7 compared with presses having conventional columns or a frame design. Prestressed-coil designs of the bed plates of rolling and tube mills are roughly only half as heavy as their all-cast counterparts.\*

\*See A. I. Tselikov, "Metallurgicheskiye mashiny i agregaty: nastoyashcheye i budushcheye" [Metallurgical Machines and Assemblies: The Present and the Future], Metallugiya Press, 1979, p 136.

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Organizing the production of the already developed lightweight designs requires rolled stock, which is still in short supply. In the past Five-Year Plan period the growth rates of the production of rolled stock and castings have been the same, which cannot be considered a progressive trend. In the next few years a corresponding reorganization of this production should be carried out, on being reinforced with a system of economic incentives such that the growth rate of the production of rolled stock would--on condition that the necessary quantities for replacing castings be allotted--exceed the growth rates of the production of steel and iron castings.

The reduction of the weight of machinery and equipment is being hampered by the widespread use of rolled shapes by the metal-consuming branches. They still account for a considerable part of all rolled stock consumed: nearly 50 percent in machine building and metalworking and from 50 to 60 percent in individual sub-sectors of machine building.

Changing the production structure of finished rolled stock is necessary in view of the accelerating development of the sheet-intensive branches of industry whose demand for rolled sheets is steadily increasing. The output of rolled sheets should increase at a much faster rate than the output of rolled shapes, in order to meet the demand of such sheet-intensive branches as automotive industry and electrotechnical industry, as well as for the production of gas and crude petroleum pipe, structural pipe, roll-formed sections, and coated sheetings, as well as for use in construction and for supplanting castings and rolled shapes. The use of rolled sheets, especially the thinner sheets and cold-rolled sheets, produces considerable savings. The adjusted cost in rubles per ton of finished rolled-sheet products is roughly 20 percent lower than per ton of products manufactured from rolled shapes. If the share of sheets in the structure of rolled stock is increased to 50 percent instead of the current 40 percent, the resulting savings to the national economy could total roughly 1.5-2 billion rubles.

The variety of output of rolled shapes is being broadened fairly slowly. Tentative calculations by experts indicate that the demand of the national economy for this output is greater than the supply by a factor of 1.5-2. To completely meet the demand of, e.g. machine building, the production of more than 800 new rolled shapes must be organized. A shortcoming of the available variety of simple rolling shapes is the smallness of their sizes, which results in either an excess consumption of metal (2.5-15 percent of the metal is wasted on chips)\* or greater metal-intensiveness of machinery and structural elements as well as in lower productivity of social labor. Increasing the number of intermediate sizes of rolled stock would serve to markedly increase the savings of metal during its consumption.

On the whole, it is worth noting that the output of the following economical rolled shapes is insufficient: rolled structural steel, high-precision shapes, and roll-formed sections, whose use in lieu of their conventional counterparts reduces the weight of blanks and products. General- and special-purpose rolled structural steel elements are more economical. Of the total number of these elements in production (970) only one-half are of lightweight design.

\*See N. F. Sklokin, "Ekonomicheskiye problemy povysheniya kachestva i razvitiya assortimenta chernykh metallov" [Economic Aspects of Improving the Quality and Broadening the Variety of Output of Ferrous Metals], Metallurgiya Press, 1978, p 138.

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Reducing the metal-intensiveness of machines depends to a large extent on the use of heat-hardened coated low-alloy steel rolled stock as well as special and light-weight rolled shapes. The national economy uses chiefly regular carbon steel in hot-rolled state (75 percent), which far from always meets the increased requirements posed to modern materials, especially in strength. Low-alloy steels are much more effective: they are stronger than carbon steels and display satisfactory plasticity, impact strength, weldability, and corrosion resistance.

An important means of assuring the durability of machines and savings of metal is a consistent increase in the volume of output of rolled stock with various types of coatings and in heat-hardened state. About 10 percent of the output of ferrous metals is lost to corrosion. The greater part of rolled stock is produced without being work-hardened, whereas the heat treatment of hot-rolled carbon and low-alloy steels serves to markedly increase their strength. Plastic-coated and aluminum sheets are produced in insignificant quantities. The economic effectiveness of the use of heat-hardened coated and low-alloy steel rolled stock has been calculated to be such as to save from 20 to 60 rubles per ton. Machines and structural elements made of such metal are stronger and lighter, and have a longer service life, while at the same time metal consumption is reduced and the metal-intensiveness of products is lower. Thus, galvanized sheet products last about 2-5 times as long as those made of uncoated sheets. The demand for these types of rolled stock is much greater than their production.

Improvements in the structure of metal and rolled stock as well as in their quality require taking a complex whole of measures to optimize the organizational structure of ferrous metallurgy and preparatory production for machine building. It is precisely the simultaneous introduction of progressive trends in the production and use of metals and the elevation of the technological level of not only the producing but also the consuming sub-sectors that assure the conditions for the fullest exploitation of the potential for metal conservation. Let us consider some of these trends.

Of major importance to elevating the technological level of metallurgical production are: an accelerated development of the melting of steel in oxygen converters and electric furnaces; vacuum treatment of steel outside the furnaces and continuous casting of steel; and a broad introduction of modern high-productivity equipment that can assure the desired quality of metals production. The possibilities for the intensification of the production of ferrous metals largely depend on the structure of capital investments in ferrous metallurgy. It is expedient to increase the share of capital investments in rolling-mill operations, including investments in improvements in the quality and expansion of the variety of rolled stock.

Promising trends in metalworking technology are: precision casting and die-forging techniques; welding and rolling of components; and powder-metallurgical methods, that is, low-waste and waste-free techniques of manufacturing components of machinery and equipment. However, the mechanical treatment of metal by cutting still prevails in machine building, and this leads to considerable waste of metal in the form of chips and increases the metal-, labor-, and capital-intensiveness of production. There is a need for the standardization of technological processes

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and the development of optimal technologies in the pre-processing shops of machine building. The structure of technologies should be planned from the standpoint of reducing material- and labor-intensiveness. It is necessary to conduct in a planned and systematic manner analyses of machine designs and processing technologies in order to uncover the potential for metal conservation and broaden the scale of the utilization of progressive structural materials. Increasing the technical and organizational level of metalworking technologies is a major means of metal conservation.

The insufficiently high degree of the specialization and concentration of preparatory (pre-processing) production in machine building impedes the introduction of high-productivity resource-saving equipment and effective technological processes. An intensive development of the centralized production of blanks would require a special planning of specialization indicators. It is also necessary to prepare a long-range plan for specialization and co-production among the machine building sub-sectors, including the preparatory production sub-sector. Capital investment funds should be allotted precisely to these specialized types of production rather than for the expansion of pre-processing shops in machine-building enterprises or for the construction of comprehensive plants.

A rational utilization of metals and a decrease in the metal-intensiveness of production depend on the scale of the application of the various structural materials used in lieu of metals. Plastics have found broad application in every branch of the national economy. The plastics-using branches have developed progressive lighter designs incorporating polymeric materials instead of ferrous and nonferrous metals. However, the level and rate of development of chemical industry as yet do not provide the technical and economic possibilities for the utilization of these effective structural materials, both in volume of output and in qualitative features. The volume of output of plastics is still insufficient, particularly as regards the output of up-to-date structural thermoplastics and glass plastics. The prices of structural plastics and synthetic resins remain high.

All this delays the expansion of the scale of use of structural polymeric materials and the reduction in the metal-intensiveness of the products manufactured. The demand of machine-building sub-sectors for plastics is on the average satisfied only 65 percent, and in regard to certain types of plastics, even less. Increasing the output volumes of structural plastics, especially those with improved characteristics that are capable of competing with ferrous and nonferrous metals; improving the technical and economic characteristics of the production of plastics; and reducing their production cost--such are the measures that will provide the conditions for not only reducing the metal-intensiveness but also the weight of the machinery and equipment built.

Clearly, in the long run, plans should be made to expedite the development of structural plastics and the refinement of the technological facilities for their production as well as of the intra-branch structure. The structure of plastics production should be so planned as to utilize plastics primarily in the sub-sectors where their effect is maximal. Such should be the target of the branch's technological and structural policy.

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A promising substitute for ferrous metals is aluminum, which displays high physico-chemical properties and corrosion resistance, low specific gravity, and good decorative properties, and effectively replaces steel and heavy nonferrous metals while at the same time markedly reducing the weight of machinery and equipment. The most effective field for the application of aluminum alloys is transport machine building. A spearheading growth rate of the production and consumption of aluminum has become a characteristic feature of technological progress. In this country in recent years the growth rate of aluminum output has outpaced the growth rate of the output of ferrous metals.

Metal conservation through increasing the technological and organizational level of enterprises greatly depends on the indicators specified in output plans. The current system for the planning, evaluation, and economic stimulation [incentives] of production in tons and by volume of output sold in relation to output achieved, results in emphasis on manufacturing heavier and more metal-intensive rolled stock and equipment. At the November (1981) Plenum of the CPSU CC L. I. Brezhnev pointed out that such indicators, which essentially encourage waste, still have not been successfully eliminated. This concerns the notorious [indicator of] "gross" [output] in tons or rubles. The enterprises are not motivated to organize the production of new lightweight rolled sections and machines, since such production adversely affects the technical and economic indicators of their performance: the volume of output sold and labor productivity decrease. In ferrous metallurgy the labor- and capital-intensiveness of high-grade production often are higher, since high-grade products require additional treatment. All this adversely affects the size of incentive funds.

As provided by the decree of the CPSU CC and the USSR Council of Ministers, "On Improvements in Planning and Intensification of the Effect of the Economic Mechanism on Increasing the Effectiveness of Production and Quality of Work," the new system of measures to further refine plan and assessment indicators is being implemented slowly and not in every branch. An economical utilization of material resources is promoted by planning such indicators as normative net output and volume of sales with allowance for the fulfillment of contractual and ordered output deliveries. It is necessary to plan a broadened products list in units of measurement that reflect more fully their use qualities.

The new indicators should be reflected in prices and standards and technical documentation. The wholesale prices introduced in 1982 are based to a greater extent than previously on indicators of the material-intensiveness of production, which serves to intensify the motivating effect of prices on the conservation of material resources. However, the planning and incentives for the production of certain types of equipment are geared to the tonnage indicator. In ferrous metallurgy tonnage also remains a major plan and assessment indicator, since on its basis it is easier to fulfill the plan by increasing the volume of rolled stock of ordinary quality. It is worth noting that experiments are under way in ferrous metallurgy to plan and account for discrete types of rolled stock and its output in terms of meters, square meters, and theoretical weight. It is expedient to broaden the approval of indicators that allow most fully for the quality of metal.



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Metal-intensiveness and standard weight of products are indicators of the economy of both their production and consumption. Clearly, these indicators should become mandatory in the design of structural elements and technologies as well as in organizing the production of new or modernized products. So far, however, sufficient incentives have not yet been provided for designers and technologists to develop less material-intensive types of products. Sufficient attention is not being paid to reducing the material-intensiveness of products at machine-building enterprises as well. This is because under the existing regulations products are manufactured if they meet all the requirements posed to them save the requirement of reduced material-intensiveness. A high level of material-intensiveness is no obstacle to awarding the Quality Badge to products.

A major role in surmounting these shortcomings will be played by the implementation of the measures, specified in the decree on the conservation of material resources, to further refine standards and technical conditions and strengthen their role in improving the quality of production and conserving material resources. Now the basic production characteristics specified in standards and technical conditions will include indicators of material- and energy-intensiveness corresponding to the best achievements of domestic and foreign science and technology. Certification of products in higher quality categories will presuppose the fulfillment of these requirements.

The implementation of the measures for the conservative use of material resources, as specified in the decree, requires corresponding revisions of the organization of bookkeeping and accounting according to indicators of rational utilization of material resources. In particular, a technically substantiated set of standards should be devised with respect to the principal material resources, all metal, and the basic types of machine-building production. Until recently, planning covered only the conservation of hot-rolled stock. As for machine-building production, it is far from being completely covered by applicable standards. As a result, for example, the volume of the production and consumption of castings has been unjustifiably increasing and hence also the share of castings in the structure of all metallurgical production has been diminishing slowly. This has been impeding a reduction in the weight of machinery. Moreover, the introduction of the achievements of science and technology is not always accompanied by revisions of consumption standards. As of 1981, the planning of tasks relating to the mean reduction in the unit consumption of materials for steel and iron castings and forgings, as well as to the coefficient of utilization of rolled stock, has been introduced. This should promote a more efficient utilization of all metal.

The decree provides for setting tasks relating to production cost--beginning in 1983--to industrial, construction, and transport ministries, enterprises, and organizations, in the five-year and annual plans. These tasks include material-expenditure limits in financial terms per ruble of output. The norms for the consumption of the principal types of materials, fuel, and energy will be determined in kind per output unit. There will be a broader list of material resources with respect to which centralized tasks for the mean reduction in consumption norms will be imposed. To implement the planned measures, norm and standard management at enterprises must be improved. It is necessary to promptly refine the existing

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norms for the consumption of raw and other materials and fuel and energy resources and to fix new progressive norms of this kind on proceeding from the plan tasks with allowance for the introduction of new achievements of science and technology.

A number of scientific research institutes has commenced to implement these measures. In particular, the NIIPiN [All-Union Scientific Research Institute of Planning Norms and Standards] under the USSR Gosplan is developing a list of the principal material-intensive types of production as well as of material resources and working out standard procedures for calculating technically and economically substantiated norms and standards and planning the material-intensiveness of production. The institute has also prepared a draft of a standard set of rules governing the awarding of bonuses for saving material and technical resources and reducing the material-intensiveness of production.

Of major importance to a rational utilization of materials is the balancing of the production and consumption of all types of resources and the presence of a centralized optimal stockpile of these resources. The shortages of certain types of rolled stock and the limitations on the allocation of ferrous metals compel the enterprises to maintain reserve stocks and ration their use in basic products. Essentially, enterprises establish their "own" stockpiles to meet various additionally arising needs, such as the compensation of losses due to rejects, which results in an inefficient utilization and immobilization of quantities of material resources at enterprises, as well as in shortages of certain types of metal.

While in the plan-preparation stage, the ministries should identify the actual demand for all types of rolled stock and the possibilities for meeting it. This requires preparing a balanced plan for the production and consumption of metals. For a proportional and balanced development of the economy, centralized material stockpiles should be provided for in the plans for economic and social development. The establishment of such stockpiles will contribute to eliminating the dispersion of resources among individual departments and enterprises and assure the possibility of selecting and more effectively utilizing the needed materials.

The decree on the conservation of natural resources considers it necessary to increase the interest of blue-collar workers, management, engineers, technicians, and white-collar workers of the associations, enterprises, and organizations in an effective utilization of material resources. Clearly, a unified system of incentives for the conservation of these resources should be set up. The incentive funds of the ministries, departments, associations, enterprises, and organizations will evolve depending on the level of material expenditures per ruble of output (operations) and on the summary savings achieved by reducing material expenditures below the established limits. The payment of bonuses to blue-collar workers, foremen, and technologists, designers, and other engineers and technicians, will be linked to savings of particular types of material resources in excess of the established technically substantiated consumption norms. Bonuses for the management and white-collar workers at production associations, enterprises, and organizations will be linked to the level of material expenditures per ruble of output as compared with the approved level, with allowance for the fulfillment of the tasks relating to production cost at the association, enterprise, or organization.

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The implementation of all these measures will serve as the basis for setting up a unified system of incentives for the conservation of resources.

The economical utilization of material resources will be promoted by converting all branches of industry to planning the sales volume indicator with allowance for the fulfillment of output deliveries in terms of full range and variety. When crediting the incentive funds, allowance should be made for the level of the material-intensiveness of products and the fulfillment of contractual obligations as regards schedule of delivery and quality and variety of products. It is expedient to increase the monetary penalties as well as to tighten the personal responsibility of the heads of enterprises and ministries and the employees of the supply apparatus for violations of contractual obligations.

As outlined above, these trends in the reduction of the metal-intensiveness of production and in a rational utilization of metal--in particular, the optimization of the sub-sector structure of metal users and improvements in the structure of structural materials--will, in our opinion, contribute to an economical utilization of material resources.

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